

ABSTRACT OF CAPSTONE

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The Graduate School
Morehead State University

March 9, 2016

DEVELOPMENTAL RESEARCH AND IMPLICATIONS FOR CTE

Abstract of capstone

A capstone submitted in partial fulfillment of the
Requirements for the degree of Doctor of Education in the
College of Education
At Morehead State University

By

Jeff M. Shannon

Louisa, Kentucky

Committee Chair: Dr. John H. Curry, Associate Professor

Morehead, Kentucky

March 9, 2016

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DEVELOPMENTAL RESEARCH AND IMPLICATIONS FOR CTE

The purpose of this developmental research was to design and launch a training portal that is focused on the specific needs of the Career and Technical Education (CTE) system, as it pertains to career readiness in Kentucky. An informal needs analysis was performed in order to arrive at a product that alleviates unique challenges being faced by CTE learners at the secondary level. Credentialing is a major component of career readiness. This portal was designed to provide resources, both human and digital, for the purpose of streamlining the process of industry certification attainment at the secondary level. The goal of this developmental research was to provide a product that answers unknowns associated with genuine preparedness of new hires into entry-level positions, as well as, what types of online CTE training yields a better return for industry. It was determined that the most effective means of achieving the overall design was to model it according to a hierarchy of features needed by CTE students, educators, administrators and industry.

KEYWORDS: career readiness, CTE Portal, motivation, industry certification, KY Tech

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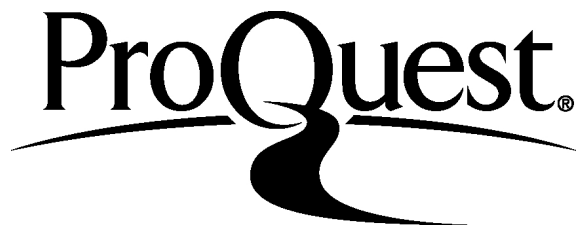
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DEDICATION

This capstone is dedicated to my family. Michelle, thank you for being such a loving and supportive wife throughout this journey. Riley, thank you for being the best daughter ever. You have grown and accomplished so many wonderful things over these past three years. You are so talented, loved, and can accomplish anything in life. We are so blessed as parents to have you in our lives. Mom, you have provided guidance and support throughout my life and could never be thanked enough. Dad, though you have passed, some of your very last words still propel me, “Are you a doctor yet?”

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Introduction

Career readiness has become a cornerstone to success in Career and Technical Education (CTE). Many attempts have been made over the years to establish a highly applicable link between technical training and the multifaceted conditions present in industry. In a request to all states by the United States Department of Education and information provided by Duncan (2012), a call for action was made to all CTE programs in every U.S. state. According to the federal government, CTE programs must offer a streamlined method that leads to industry certification (p. 5). According to Radcliffe (2013), “Trends among adolescents continue to be discouraging in terms of career and college readiness based on National Assessment of Educational Progress (NAEP) achievement reports and high school graduation rate data” (p. 136).

If one takes a second look at the request above, it becomes clear that there is a great need that is looming for the CTE system. There is a call for an innovation that is both relevant and engaging. Due to this connection, the decision was made to focus on the creation of a CTE Portal that would serve to strengthen many areas of the career-readiness process. According to the California Department of Education (2007), our technology-driven jobs both now and in the future will place great demands on our workforce. They will be required to retrain at a frequency and to a degree like never before (p. 3). Simply stated, there needs to be a system that can easily adapt to the rapid changes in technology-driven industries. The following

information was included to better explain how the reach of such a portal, at the high school level, extends far beyond what appears on the surface.

The processes for retraining will become much more effective if the next generation of hires possess 21st Century abilities. Technology will continue to change. Training, equipment, and procedures will be drastically altered on multiple occasions during one's career. According to Snyder and Bristol (2015), online resources focused on career readiness serve as a vehicle for evaluating career development (p. 20). Preparing future technologists to stay current with a portal-type system makes the approach more accepted later in a career. On an even higher level, it creates a cycle of live industry resources to share experience from generation to generation. This helps to highlight the importance of raising awareness for research and benefits possible for prospective technicians. The implementation of a career readiness portal now will make CTE learners more prepared for a lifetime of technical change. This naturally opens the door for new, more concrete research on the retooling capabilities of the American workforce.

Impact for Kentucky CTE Schools

Strong efforts are in place to prepare learners for variations they may experience in future careers relating to mathematics, oral and written expression and other academic practices. Erdogan and Stuessy (2015), "Finding from the studies exploring college and career readiness of students attending these schools revealed students from specialized STEM schools are performing slightly better on high-stake

mathematics and science tests in comparison with students in traditional schools” (p. 77). According to the Association for Career and Technical Education (2009), CTE programs of study now consist of both academic and technical components. Also, their future career will rely on abilities in reading comprehension, making decisions and reporting on them effectively (p. 3). Their abilities to perform in these areas are continually measured with a multitude of assessments and other activities throughout the high school years. Certainly, this is a method that should continue. It is worth noting that all of these areas have the potential to be strengthened through increased opportunities brought about from the existence of a CTE Portal.

It is clear that alignment between industry needs and training makes all the difference in achieving our nation’s goal of a career-ready workforce. In the work on career readiness put forth by Fuller (2014), “Students would gain a deeper understanding of content and an inquiry process they could use in college, careers, and life” (p. 57). According to findings put forth by the U.S. Department of Education (2013), “New legislative provisions, which promote the alignment of secondary and postsecondary education through programs of study (POS) that, among other things, lead to an industry-recognized credential or certificate or degree at the postsecondary level, reinforce this goal” (p. 1). Time and again, alignment to industry-recognized credentials is at the center of numerous performance indicators set forth by Perkins Accountability measures. States from coast to coast are working diligently to answer the call of career readiness initiatives. According to Affeldt (2015), “Senate Bill 1458

required the state to add more achievement indicators to the API, such as graduation rates and college and career readiness, beyond standardized test scores, thereby already pushing the state toward a more robust notion of academic achievement consistent with new accountability” (p. 9). A widely implemented CTE Portal fills many of the gaps between the wants and needs of federal and state stakeholders. More importantly, it naturally keeps high school students aware of what is being asked of them in terms of career readiness.

The Problem and Initiating Implementation

According to the Texas Workforce Development Council (2015), “Across the nation, the process for collecting data on industry-based certifications is either limited or in development. Without a method to track industry-based certifications, it becomes difficult to determine how industry-based certifications fit into and benefit the overall workforce system” (p. 3). There is a pressing need in CTE to increase motivation and experience with industry certifications, other career readiness assessments and the process of obtaining such credentials. Having a means to gauge a technology learner’s current industry experience presents educators with highly-applicable opportunities to prepare them for effectively pursuing career readiness from an industry needs perspective.

CTE programs primarily consist of both a traditional classroom and lab setting. The lab component is designed to mimic the industry environment. This hands-on approach allows learners to experience new concepts that are introduced in

the standard classroom environment. The CTE Portal is designed to operate in unison with these applicable methods of instruction that are already in place. This product serves as a new means to bridge applicability in the lab environment with the needs of industry.

Even with the considerable attention on career readiness, data reporting gaps between industry and training still persist.

While every school reports the percentage of entering students who graduate and the pass rates on various high school assessment tests and advanced placement exams, the school-based reports do not show how many occupational certifications were earned, how many students entered a job or apprenticeship in a field related to their high school CTE program or work experience, or which employers hired CTE and other students (Lerman and Packer 2015, 10).

The CTE Portal addresses many of the unknowns in the passage directly above. It is important to allow the career-readiness process to help school districts. However, it is critical that we use technology to track the impacts career readiness has on new industry hires that have completed the process. The portal's design allows for data to be collected at this level for years to come.

With all of the recent developments with career readiness, it is important to point out that the tried and true CTE approach itself is not being questioned. The hands-on methods of instruction are still pivotal to the overall success of career and

technical education. The development of the CTE Portal centers on the premise that technology instruction is becoming more credential-driven.

It is true that technology training can closely mimic the conditions of industry. Industry can even become actively involved in the design of the training process itself. Even in the earlier stages of career readiness, it is apparent that industry remains at the center of career readiness. According to Hess (2007), “During Perkins III, local school districts and postsecondary institutions reviewed and revised their career and technical education (CTE) program curriculum to be based on nationally or state industry recognized standards, and to organize their program sequences according to the national career clusters” (p. 5). With this leverage in mind, at content relevancy in the classroom at the center, it became logical to look to a CTE Portal to bridge the gaps that exist between learner, program and regional industry resources.

There are great benefits to relying on industry for support. However, when responding to today’s rapidly-changing technology needs, this is no longer enough. Industry may come in and offer support in the design of a new program. By the time CTE learners are a few years into their careers, the technology and many of the procedures will have changed. A CTE Portal has the potential to streamline this process and ultimately increase relevancy and competitive edge by strengthening both overall abilities to retool, as well as the rate in which success is achieved in the process.

To expound a bit further, CTE training, even with the active guidance of industry representatives, only prepares technical learners for a snapshot, if you will, of the current conditions. The face of the industry could change dramatically between the time period these program design decisions and investments were made. Furthermore, this is taking place within the environmental, equipment and budgetary limitations of a given high school CTE program. A CTE Portal seeks to better equip technology learners with timely information. This is a vital component in systematically increasing relevancy in our CTE programs and spurring motivation to pursue industry certification. On an even greater level, the process growing accustomed to looking at a portal for guidance also develops the basic demeanor necessary to accept industry change.

Society has become expectant of continuous technological advancement. In addition, current economic conditions are greatly impacting our schools. Keeping these factors in mind, it is imperative that emphasis becomes heightened in the areas of industry certification and career readiness in CTE.

According to ACTE (2006), “By working directly with business and industry, and offering students at the secondary and postsecondary level the opportunity to gain industry-based certifications in computer science, automotive technology, health care and other high demand areas, CTE programs provide a benefit to students and their future employers” (p. 6). This statement is at the core of the future of CTE and helps to illustrate how a career readiness portal aligns to make these goals more achievable.

Learners must be prepared to apply new information in more seamless and innovative ways to get beyond the snapshot that occurs in the standard CTE lab environment. As previously stated, what is relevant at the time of training could quickly become outdated soon thereafter. This common occurrence basically leaves new these technologists to their own devices in terms of them reacting to change in the field. In addition, learners must also retain great resolve in their attempts to adapt to these ever-present challenges faced in technology fields. A more industry-credential focus will prepare CTE learners for further down the road, as these certifications are based on trends in their corresponding fields.

It is logical to consider learners with personal interests in specific subject matter will be motivated to complete tasks associated with the material. They will index the information more applicably due to being able to visualize its use early on in the lesson. However, this productive process does not always seamlessly occur with every learner. Industry certification has the potential to bridge gaps between learners that are less motivated and course content. This is pointed out in the research performed by Brett Jones (2009) as he explains how learners faced with adverse conditions actually get more enjoyment out of the activity, are calmer under pressure and attain a higher level of success (p. 276). Under these conditions, learners become personally invested in the process. Becoming industry certified and on the road to career readiness serves as an effective method of getting CTE students to make these important connections. A portal has the potential to be an additional means of

allowing learners to personally perceive applicability. With this CTE Portal being designed to keep learners focused on certification, it systematically fills many of these gaps that occur due to occasional dips in personal interest.

The portal itself was designed to take into account how high school students will be at different stages of the career readiness process before they become serious about the industry certification process. This is important due to the fact that many fields in industry have a multitude of certification paths to choose from according to personal goals.

It is important to differentiate between exploratory and preparatory CTE learners. The Kentucky Department of Education (2015) states an exploratory student is defined as, “any student who has enrolled in the beginning sequence of courses (up to two credits) in a secondary career and technical education program that requires at least four credits to complete the program” (p. 30). A preparatory learner is defined as, “any secondary student who has completed two credits in a pathway AND is enrolled in the third/fourth credit within an approved CTE pathway” (p. 31).

Exploratory learners are normally in their first year in a program of study and often possess less exposure to what industry certification has to offer them on a personal level. By gathering data on these learners, it may become possible to assess additional relationships according to experience in a given program of study. The CTE Portal was designed to be adaptive. A user in the system is presented with

presets that automatically caters the environment according to the status and goals provided during the registration process.

It is clear that federal, state, local and industry bodies must come together in a pattern of greater unison to meet the needs of CTE learners. To analyze and improve upon an area of education that is so heavily focused on hands-on, applicable practices, there is a great need to provide those being asked to change with a product that is easily perceived as both applicable and relevant. Finally, this certainly provides a rich area of further research that extends well into the careers of these future technicians. Applicable data provided by the CTE Portal will serve CTE stakeholders well in terms of allowing them to remain more current in their pursuit of forward-thinking objectives within career readiness accountability in the United States.

Review of Literature

The literature available on the use of websites and portals is abundant in the general areas of the topic. However, a decrease in resources becomes apparent when one is viewing through the lens of CTE training. Even though this limitation exists, the work of others remains highly valuable in order to better determine direction for continued research in this area. In order to move forward and develop effective strategies for CTE district leaders and instructors, a closer examination of work already performed is important. Trends and barriers that come into play with the use of such technology becomes enlightening in terms of prevention through design.

Applicable learning objectives can be stated and restated for years to come in respect to career readiness. A major hurdle in CTE relates to the amount of time technical programs of study actually have with their students. This is a major advantage to the proposed use of a CTE Portal. According to the findings of Pickett and Hamre (2002), “Portals help make more efficient use of an individual’s time, one of the most important organizational resources” (p. 39). There needs to be a more systematic way of getting from point A to point B at the secondary level. This is true in terms of growth in both industry certification and the general paths leading to career readiness in our CTE programs of study. From a training perspective, a great deal of time and resources can end up being ineffectively executed in a program of study. The absence of such a portal, or approach, often leaves high school CTE students playing catchup during the latter part of their schooling.

According to Dougherty and Fleming (2012), “Furthermore, goals for percentages of students reaching college and career readiness achievement targets should take into account the students’ starting points and the number of years that schools have available to catch them up” (p. 2). These findings bode well for the use of portals to achieve career readiness goals at the secondary level. However, the implications do not end with high school. With the rapid pace of hiring and retooling in technology fields, a rift in career and technical development could also result. This is in addition to the burden of sifting through potential hires that do not have the certifications to help illustrate their readiness to enter college or actual career phase of

life and the on-the-job changes to follow. McGill (2010) states, "Portals provide structure and a set of requirements that can assist states in consolidating information from multiple institutions" (p. 2). The author continues to point out that portals are viewed as content relevant and containing a logical user interface in which learners can effectively respond (p. 3). To be clear, at the secondary level, students often do not begin to seriously look to industry certification until their junior year. This further compounds issues related to time educators actually have with CTE students, as well as presents a strong argument for the use of portals in career and technical education programs of study.

As previously stated, the CTE Portal alleviates many of the unknowns that deprive high school students of limited time to devote to career objectives. In addition, it is important to be able to make some level of determination on when a CTE learner begins to reach that pivotal point of being able to visualize what industry certifications and career readiness can provide. Researchers recently analyzed the area of limited time and its relation to effectiveness of Washington secondary schools in regards to them preparing students for a future career in CTE industries. According to the findings of Peltzman and Domaleski (2010), "We strongly encourage Washington to implement mechanisms that provide stakeholders with timely access to information on key college- and career-ready indicators" (p. 23). These researchers reiterate the point that time is of the essence. Their research is designed to direct students back on a promising career path while there is still time to effectively serve

them before graduation. According to their research, 87% first-generation college students completed a degree after going through a highly rigorous program of study in high school. It is statistics such as this which highlight the potential that a product, such as the CTE Portal focused on in this work, can have if administered to the masses.

It is one thing to simply offer a product that falls in the vicinity of the needs at hand, it is another to meet a specialized need. To locate one of many prime examples of education and industry uniting through the use of a portal, one could look to the Harvard University DASH Repository.

Samur et al. (2013) were recently faced with design choices that ultimately called for an online portal. “Consequently, there is an urgent need for reliable tools that integrate and interpret these data in light of current knowledge and disseminate results to biomedical researchers in a user-friendly manner. We have built the canEvolve web portal to meet this need” (p. 1). There was a need for a product that provided the specialized tools, resources and data collection specialized to the delicate nature of this research being performed. In short, a portal was determined to be the means of addressing this need. It is true that cancer research and career readiness differ widely. There is however common ground that exists. The Harvard researchers were in great need of a product in which to pool multiple resources, both human and data in nature, in order to make strides towards goals. Career readiness and technology industries also continually change. There are challenges to meeting

relevancy in subject matter and benchmarks. In order for our nation to continue to build a new framework for career preparedness, it must be founded on industry needs. The CTE Portal allows districts to overcome many of the communication hurdles between secondary career training and industry resources.

Ken, Greenhill and DeWitt (2010) determined, “Performance-based assessments—developed and regularly updated in collaboration with employers and aligned with industry standards and competencies—are a hallmark of CTE programs” (p. 22). It is important to take steps to ensure that this long-standing and effective strategy continues to be viewed as such by the outside world. This places greater urgency on CTE to look to a products such as the CTE Portal to better ensure a continuation of this alignment with the objective now in place with career readiness.

A system centered on genuine readiness has the potential to meet such objectives. However, this hinges on opportunities to equip CTE educators to align their instructional practices with the needs of post-secondary and industry. According to the findings of Cavanagh (2006), “Over 40 percent (42.4 percent) of employer respondents rate new entrants with a high school diploma as “deficient” in their Overall Preparation for the entry-level jobs they typically fill” (p. 13). One highly effective way to combat this issue is to bring industry certification more within grasp. These certifications are specifically mapped to current and projected needs of the industry. In other words, a CTE student who attains such achievements will be better poised to remain an asset to the industry for years to come. With motivation and

knowhow continually on the rise with high school students and technology, the CTE Portal emerges as a go-to strategy to attain greater effectiveness.

Career readiness has become a major player in our CTE programs of study, both in Kentucky and on a national stage. Dicheva, Sosnovsky, Gavrilova and Brusilovsky provide solid perspective on the use of portals within a specialized field. According to Dicheva et al. (2005), “We further believe that the O4E Portal will make it possible for the interested part of the O4E community to collaborate on extending and refining the ontology and keeping the resources current” (p. 20). This is at the core of industry certification and challenges that arise in the pursuit of career readiness success on a larger scale. Collaboration can occur within career readiness like never before. Learners with high motivation can contribute to the growth of the portal by openly sharing their resources that will reach peers that may be in need of additional perspectives.

According to ACT (2011), only five countries in the world met both the reading and mathematics U.S. CCR standards. This ACT research, in addition to others, shows that CCR students are more likely to meet the demands of a globally competitive workforce. The CTE Portal, and the research opportunities created from its use, sets out to delve directly in to the benefits of such extensive prior research. The main difference being that it brings the data into the classroom level in a timely manner that is conducive to rapid growth.

In order to make adjustments to the overall process and increase effectiveness there must be data. There must also be an efficient means of accessing this information. Data Quality Campaign (2012) approached the evaluation of college and career readiness from this quantitative perspective in their recent work. The research shows that state policy-makers must be driven to lead local officials toward effective, long-term data tracking and analysis. A major issue with career readiness, in terms of long-term data tracking, stems from a large population of CCR students traveling across state lines for post-secondary endeavors and a career. This magnifies the urgency for CTE in Kentucky to have specialized certification training and research portal at the ready while learners are still at the secondary level. This will greatly increase the pool of data to draw connections from and continuously keep doors open for training improvements. The Wisconsin Department for Public Instruction (2011) provides more specific evidence in their research.

“National data from the U.S. Department of Education on participation in remedial education found that 34% of all new entering college students required at least one remedial education class. Effective Career Pathway development can help Wisconsin students avoid remediation and continue progress in their chosen career field” (p. 31).

Secondary CTE learners will need to meet certification and various other training achievements in the midst of other academic requirements they face on a daily basis. To elevate the urgency the researchers also determine, “Today, middle skill jobs still

represent the largest share of jobs in Wisconsin—some 54 percent—and the largest share of job openings into the next decade” (p. 64). Preparing them with a mindset to look to a training portal, while still at the secondary level, poises them for success in this arena.

The data that is currently available points toward the assertion that many students are still not becoming truly career ready. The U.S. Department of Education (2010) states, “Because remedial students are more likely to drop out of college, their earning potential falls, which costs the nation’s gross domestic product an estimated \$2.3 billion a year” (p. 3). In order for a college and career strategy to be effective, there must be clear and consistent expectations made known to our students, parents, educators and industry. Simply put, a product such as the CTE Portal is that missing hub desperately needed in the community.

Alignment is not limited to the classroom walls. The Nebraska Department of Education (2011) states, “Educators are encouraged to work with local business and industry councils to define learning objectives most appropriate for their situation” (p. 9). The researchers examined how career readiness allows students to discover their talents and unlock their potential through a combined effort of state, local and private sector. The Nebraska Department of Education continually point out that it is strong partnerships between students and industry that makes college and career readiness strategies successful. This is a major reason why the communication capabilities, within a specialized environment, offers such potential to CTE learners. In addition,

increased rigor in these specialized areas makes the process of students transitioning from secondary to post-secondary more seamless.

Kentucky is prime example of a state having a differing view of CCR. KACTE (2011) states, “College Readiness and Career Readiness are two separate concepts; there are commonalities between them, but also some significant differences” (p. 1). A view not shared by many other states. The state divides CCR into three separate categories. Technical skills, academic proficiency skills and employability skills are named as the sections of this statewide measure. Industry certification, KOSSA, ACT, COMPASS, KYOTE, WorkKeys, ASVAB and the NOCTI assessments have been deemed acceptable systems for measurement in Kentucky.

Secondary students benefit from clarity in their career development. Cohen (2010) states, “According to the FAA, aircraft maintenance technicians need to be comfortable working with complex measurement, proportions and ratios, solving equations with multiple variables, calculating volumes, and modeling with linear equations” (p. 9). Such examples show that goals must transform from simply graduating or wanting to go to college to being fully prepared to meet the challenges of college and career.

The Virginia Department of Education (2010) states, “Approximately 13 percent of students who earned standard diplomas enrolled in four-year institutions; students who earned other credentials had small chances of enrolling in four-year

Schools” (p. 11). It is logical to consider that additional training, such as that leading towards industry certifications would better prepare these students for the next step beyond high school. The research provides a timeline of progress on college and career readiness in Virginia over a 15 year period. According to research provided, 80% of job openings will require postsecondary education or additional training over the next decade.

Motivation is an important factor for career readiness to maintain longevity. In the certification realm, students become motivated when they see evidence of lifelong benefits. Bartlett (2004) conducted a quantitative analysis that delves into the concept of gaining a competitive edge through the earning of industry certifications versus that of traditional education and experience. Information technology and automotive service were chosen as fields to be analyzed. A sample of 202 managers in three major cities was analyzed in regards to their educational backgrounds, demographics, and organization characteristics. The 42.1% to 60.75% ranking of resumes suggests that applicants with certifications, but no experience, will be rejected more often in IT than automotive. However, the data overwhelming supports the favorability of a combination of experience and certification or a postsecondary education. Despite the field, employers need versatile new hires in order to adapt and react to a barrage of technology challenges.

Castellano, Stone and Stringfield (2005) explored this overall effectiveness of CTE to even greater depths, as it relates to engaging and motivating students with

industry certifications. Their work illustrates the need for school districts to closely monitor the success rates of student industry certification attempts. The researcher's focus was directed towards whether certifications are effective measurements of quality in career education. From a policy perspective, the results indicated that with such emphasis on academics, many districts will struggle to meet upcoming industry standards. In addition, the research leaned towards pilot studies to determine district needs and feasibility before adopting major legislative change. It will remain difficult for school districts to meet all of the needs in a multitude of changing industries. However, with a renewed and innovative portal approach at the secondary level, future technologists become more capable of meeting the demands of change itself.

Many educators would agree that a link exists between industry certification success and program effectiveness. As stated by Hainsom and VanNoy (2004), "Because of academic graduation requirements, the time available for IT certification classes can be limited, and some high school programs may not cover all the skills required for certification" (p. 17). The study also reported that high schools are only averaging about one-third as many successful industry certification attempts compared to postsecondary institutions. The research points out the need for technical programs at the secondary level to become proficient in providing industry certification opportunities.

CTE can act as a bridge between these students and opportunities available in local industries. To bolster support, this win-win for students and local employers is

an area that needs to be further examined. Muller and Beatty (2008) provide evidence to help inform others on how effectively industry credentials prepare high schools students to meet goals. It provides specifics for central office staff to consider when developing policies related to career readiness. Also, the preparation to earn such credentials does add rigor and relevance to CTE. Such preparation and achievement becomes more applicable when the information is being indexed in a systematic means leading to application beyond the classroom walls.

The findings of McGill (2010) states, “a well-organized portal represents a self-service model that addresses the needs of today’s students who want the ability to get the information and services they need when they need them” (p. 1). In addition the author concludes, “As states are working to create effective educational pathways in K-20 and beyond, portals can address the needs of all students” (p. 11). The common theme in this research is meeting the needs of learners. The ability to tailor an educational portal makes change a reality.

Adeyinka and Bashorun (2012) provide insight into the actual impact of portals as they conclude, “Web portal comprises of appropriate learning and communication tools that can enable translators to upgrade their knowledge and skills in the use of current localization technologies, from anywhere, anytime, at their own pace” (p. 719). The authors connect the success for portals in education primarily to the advantages of high levels of peer interaction and customized resource at the ready.

The design aspects of online portals have been carefully analyzed over the years. According to the work put forth by Large, Beheshti and Rahman (2002), “In general, it seems preferable to include on a Web portal some entertainment distractions as well as clearly identified routes to information retrieval” (p. 92). In addition, the authors provide a guidance for design by stating, “The ultimate objective is to elaborate a matrix that will permit portal designers to incorporate just those design features that will optimize portal efficiency through personalization for any given user group” (p. 93). It is clear from the previous research; design must be honed to accomplish a balance between organization and customization.

According to Howard Strauss (Jossey-Bass, 2002), “portals make users much more efficient and productive, and provide a compelling, entertaining, and educational experience for all who visit” (p. 40). The technical and employability opportunities for students provide industry with the new hires more likely to prosper in their work environments. There is also emphasis on a renewed option to show academic relevance.

Conceptual Framework

Connecting CTE instruction and industry to research is certainly a challenging endeavor. There are several components and stakeholders that need to align for the process to lead to lasting change. In developmental research such as this, the rewards are worthy of the investment.

The guiding mission of the CTE Portal remains driven towards providing technical training, and serves as a means to connect this CTE training to research. The problem that frames these activities, stem from the fact that the needs of school districts are increasing in terms of their ability to provide industry training and track progress into entry-level careers and beyond. Career readiness continues to gain momentum. The unknowns that still surround preparedness on this level of training strengthens this developmental research.

The CTE Portal is designed to offer relevant training options and opens new doors for CTE research. CTE instructors must have access to a product that allows them to tailor additional program-specific resources without compromising the environment's design. With the focus of CTE now directed at credentialing, industry leaders need to be connected to the program like never before.

In short, for genuine career readiness to occur, it takes a CTE village. This community is comprised of CTE students, instructors, administrators and industry leaders. Obviously, the students are the central focus group of the CTE Portal. Within the CTE Portal, a variety of training methods exist to mesh with the learner's preferences. CTE students are connected to industry representatives, providing them with valuable relationships well into a career. CTE students benefit from multiple features within the portal that are designed to facilitate peer interaction.

Another key group that is central to success in this work are the CTE instructors. These leaders are the experts in their field and know where learners are at

in the process and the additional, program-specific resources needed for success. CTE instructors must have a product that provides them with the learning materials that align with industry needs. These resources provided to CTE learners will be perceived more relevant as the portal's design helps to show how new information aligns with career and certification goals. The CTE Portal sparks motivation through content that is relevant to career goals, an achievement points system, and placing certification within arm's length. The CTE Portal provides a new medium in which to display student projects. This is a much needed area for CTE as industry leaders will now have a more streamlined method of monitoring developments.

Another group essential to this overall process is made up of the surrounding industry leaders. Industry committee members will have a more vested interest in the training facility as a result of them creating relationships and having more of a voice in the program's direction. When all stakeholders are using the CTE Portal, the needs of both students and industry become known in a more real-time process. The product provides a more effective method of communication between educators and industry. This exchange allows state testing (e.g. KOSSA - KY) to be more representative of genuine career objectives. As CTE learners go through the process of using a portal to meet technology training needs, they become more apt to successfully repeat the process of retooling throughout their careers.

Obviously, CTE administrators are also an important group that possess tremendous influence on the direction of the organization, as well as the providing of

resources to programs. CTE administrators build a bridge between the organization and resources necessary for success. The list of industry and state technology assessments are growing. Having a product tailored to assist in this area becomes a welcome means of increasing effectiveness for administration. The CTE Portal provides additional, and more logical, means of connecting industry members to the training facility. This makes the communication of needs a two-way street. In order for an organization to arrive at a relevant vision, it must be one that all levels of the institution can both relate to and perceive as doable. The CTE Portal bridges these gaps by making objectives attainable, and the needs publicized. CTE administrators now have a product that can provide them with vital information on their programs while minimizing disruption. In addition, the CTE Portal is a natural means of creating documentation for program reviews. The CTE Portal opens doors for Administrators to become better equipped to lead their organizations in a more boundaryless environment. Though the programs of study and associated exams are very different, there is still a greater level of unity that occurs from the portal's use by the removal of barriers. This is a result of the whole organization being aware of the overall process of relying on a centralized training portal regardless of subject matter. This in turn, leads to program leaders having increased opportunities for collaborative activities across multiple industries.

A CTE Portal has the potential to bring much-needed resources to the table. Many of the challenges that have been faced in CTE over the years such as; funding,

industry partnerships and alignment to certifications standards would have less of a hold with the use of this approach. Through use of the product, strong links and be established between all-important student motivation and design.

Methodology

Design

This developmental research specifically focuses on the creation of an applicable and strategically designed CTE Career Readiness portal for secondary students. An online portal was chosen as the most fluid means of bringing together the multiple industries contained within CTE, as well as the aligning of these programs with the numerous resources and certification opportunities that are associated with them. The CTE Portal was designed and created in order to have an effective means of gathering data, providing treatment and soliciting feedback. The name of this portal is CTE Portal and will be accessed, by invitation, at the assigned URL: <http://www.cteportal.com>.

Connecting Design with Applicability

The specific nature of using a portal to address the needs of career readiness places a heightened emphasis on features in terms of design effectiveness. This directs development towards the logical choice of Feature Driven Design. Feature Driven Design (FDD) is a development process, normally centered on software, which is formally categorized under agile modeling. FDD was put forth by Jeff De

Luca in 1997 in order to effectively customize front and back-end software processes needed in business. The process was later refined and published by Palmer & Felsing (2002), which more closely reflects the design choices made for the CTE Portal.

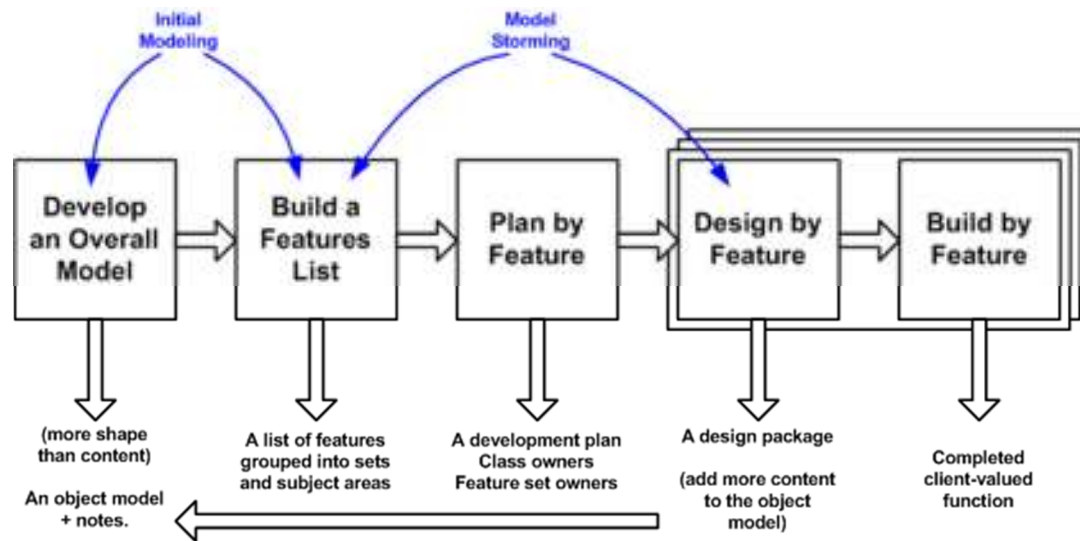


Fig.3-1. FDD Project Lifecycle. Palmer, S. & Felsing, J. (2002)

As seen in Figure 3-1, an initial step in the design phase consisted of the creation of a prototype for the purpose of being able to better visualize the needs of CTE users. Developmental research could then move forward with a tangible plan of action for the purpose of making critical decisions on what features needed to exist in the product and why. As continually stated in the literature present on portals in education, it is vital that resources be closely tailored to meet the needs of users. In addition, these resources can be lengthy and vary in media type. This increases the

importance of adhering to the proper completion of the prototype stage in the development process as illustrated in Figure 3-2.

Fig.3.2 Initial Features for Users

Exploratory	Preparatory
Registration	Registration
Social/Entertainment Components	Social/Entertainment Components
Certification General Information	Certification Prep
Communication Systems	Industry Partners
Administration (Back-end)	Organizations
	Community
	Administration (Back-end)

Once there is a general grasp of the overall features that will drive the decision-making process, then it becomes necessary to make plans according to specific features. This component in the model allows the product to grow in intuitiveness. One of the first design challenges is to be able to more methodically group CTE learners according to their current career readiness status. This alleviates a major issue in keeping track of students as the progress through multiple programs offered at a technology center. The registration page is the first step in overcoming this challenge. As users register they select their current career readiness status, thus placing them in the proper subset of the portal's database.

The exploratory and preparatory modes house resources that would be most beneficial to the CTE user according to their current career readiness status. These two modes have different objectives that impact the overall design. The exploratory mode focuses primarily on options, advantages and career outlook. The preparatory mode also incorporates many of these important options, however, the emphasis changes to certification preparation and industry networking opportunities. Four important components of the preparatory mode include; community, industry, college and trade organization opportunities. It is logical to consider that this will aide in bridging the gap between secondary CTE training and the next phase of the learner's life.

Both modes were connected to a communication system which consists of discussion boards and a messaging system. In addition, a peer shoutbox was created for the purpose of sharing ideas and showcasing projects completed in the CTE programs of study. The storyboard below in Figure 3-3 provides additional insight into both the cycle of use through the portal and unique networking opportunities.

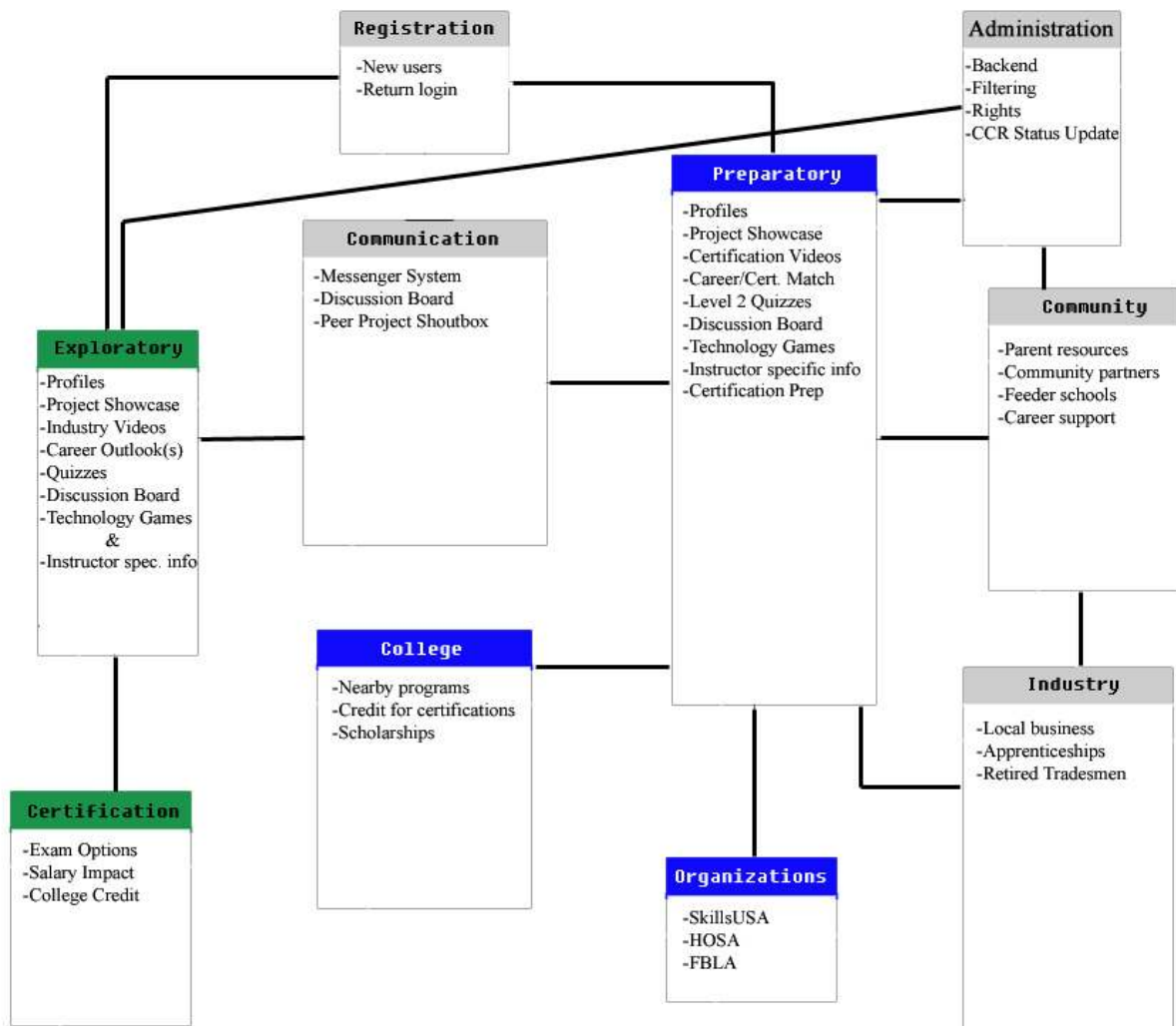


Fig.3-3. Research Portal Hierarchy. Shannon, J. (2015)

Though currently developmental research, there will come a time when the CTE Portal will make the transition into the phase of data collection. Due to the large variety of programs of study, industry certifications, and the sheer number of CTE students that will be tracked for multiple years, this aspect of design must be carefully

considered at the onset. If a database is initially setup to perform tasks that will be asked of it at a later time, it will be more stable in the long run.

The design of the portal, from a research perspective, offers a natural user interface that lends itself well to case studies performed by way of a mixed-methods approach. The reasoning for this design decision hinges primarily on the nature of the environment, time limit with CTE learners, and need for both statistical and qualitative data in associated with industry. It was determined that a design focused on a purely qualitative approach would not effectively reveal the numbers needed to discover data relationships in this specialized area. On the other hand, a quantitative only study would not afford the opportunities to delve deeper into the mindset of learners in this complex behavioral area of motivation towards industry certification and career readiness. Having the two methods working in unison provides a perspective that becomes more applicable to CTE instructors. This avoids the pitfall of students, instructors and administrators having to learn how to use multiple user interfaces according to program. This, in turn, allows others in the building to act as experienced resources across regardless of CTE program area.

Description of Future Participants and Users

The participants of the CTE Portal will consist primarily of CTE learners in grades 9-12, career and technical education instructors and administrators. The projected users for the CTE Portal are learners and educators in District 11, state-operated, area technology centers (ATC) which are located in the Eastern Kentucky

region. These learners fall under either preparatory (second-year) or non-preparatory (first-year) students enrolled in a given programs of study. To reach the status of preparatory the learner must be, at a minimum, enrolled in their third CTE course. Exploratory status is the classification from entry into a CTE program to the end of the second CTE course. Many of the skills-based technology programs offered at these area technology centers consist of predominately male learners, with the exception of the nursing and business marketing programs. However, due to the enrollment size associated with these two programs, the overall population of the CTE Portal becomes more balanced in regards to gender. It is worth noting that a few programs, such as welding and carpentry, show a trend to be underrepresented by female CTE students in ATC District 11. This will be further discussed in the limitations of the product section found later in this work.

Selection of Coding Languages and Software

The initial or basic shell of this portal was created from a combination of .PHP generating software and hand coding. This decision to rely on .PHP was deliberate as it is trusted to allow increased functionality for many years to come, as well as the language's innate ability to coincide with MySQL software for online, database-driven platforms. As with nearly all software, there are pros and cons. It is important to point these out early on as they impact initial design decisions. In addition, this is of increasing important in terms of potential duplication of developmental research of this nature.

MySQL/phpMyAdmin for Research	
Pros	Cons
Low-level data backup and retrieval opportunities	SQL injection security risk
Open-source with support	Learning curve of database language and usage
Multi OS Capabilities	Real-time performance monitoring limitations
Large selection of peer community resources	

Fig.3-4. MySQL/phpMyAdmin for Research . Shannon, J. (2016)

Functionality and performance is always a primary concern, however, the visual and navigation experiences are also important. The addition of Cascading Style Sheets (CSS) provided a means to better customize the portal according to the expectations of the industry or trades-oriented audience. Nearly as important in this design choice, the automation abilities associated with CSS in terms of text, mouse-over, navigation and background settings frees up portal administrator(s) to focus more time on performance and growth. The two languages are long recognized to sync well in terms of the backend or administration side of an online portal or general database-driven resources.

A considerable portion of the portal, as well as many of the online resources encountered all over the web relies on database queries to get information sets returned. In other words, there are specific statements that render intended results.

To provide an example of this, one could look to the SELECT statement. An SQL statement could be issued to extract data from a table on the database that houses only preparatory members. This could be done to put together potential participants in a research study, or it could simply be an instructor wanting to know their career readiness percentage for a give program of study.

Standard SQL:

```
SELECT LastName FROM Preparatory
```

Fig.3-5. SQL SELECT Statement. Shannon, J. (2016)

As shown in Figure 3-4 above, MySQL relies on predefined query, or request, to access data from a highly-structured database of tables. The ability to be able to select data according to groups becomes essential for research purposes once the number of registered uses greatly increases over the years.

In addition, Figure 3-5 below shows how MySQL provides another means of navigation through the use of a collapsible, tree-like menu interface. The importance of this choice from a design perspective for the CTE Portal must be elaborated.

Within a portal, administrators must have the ability to quickly get to the lowest level in which the data is physically located. It is true that the administrative panel, or back-end of the portal, can provide the components to handle nearly all average user issues. However, having a failsafe is vital. There are instances when databases and back-end control panels either do not successfully execute the

command that is sent, or does not have the option already built-in to address an issue that arises.

The abilities of the built-in Import and Export utilities also provides CTE researchers with a means of pulling down specific records and making adjustments to the data as situations may arise. Then, the data can be imported back into the database. This can be done with minimal to no disruption in front-end activities or alterations to member's user credentials.

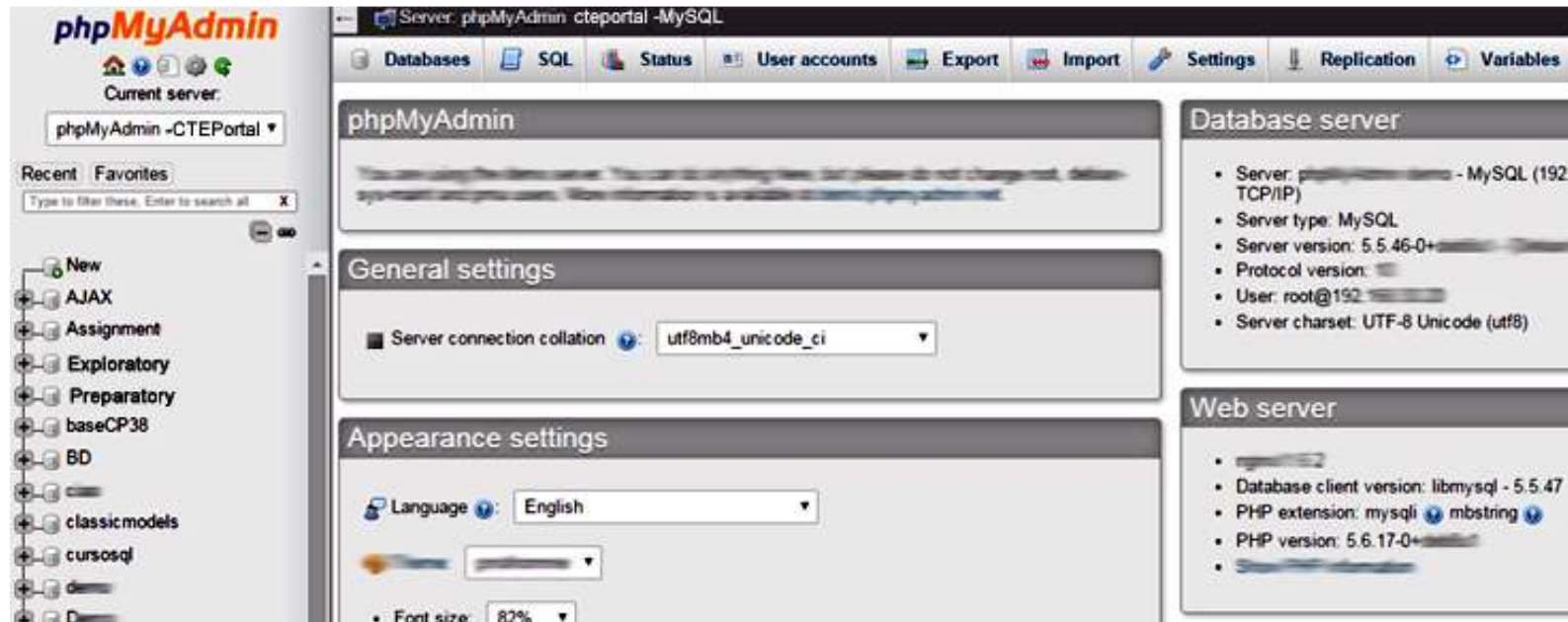


Fig.3-6. phpMYAdmin CTEPortal. Shannon, J. (2016)

Sample Size Capabilities

Technical decisions that involve data are critical in terms of better ensuring that a product is being developed that can maintain great potential in terms of sample size and data collection capabilities. Careful consideration of these factors during development avoids the software pitfall of having to force a system to perform actions it was not initially designed to later.

The natural interaction that takes place within the portal's design, paired with the capabilities of MySQL makes for seemingly limitless opportunities in terms of immediate and applicable data collection on a large scale. In addition, the ability to track data on into the user's actual career opens the doors to a level of CTE research like never before. This makes the partnerships between industry, community and educational entities pivotal. This will allow for relationships to be determined between learners exposed to industry certification training at the secondary level and how it translates into genuine career preparedness.

As shown in Figures 3-6 and 3-7, the portal consists of modules designed to motivate peer interaction for CTE learners. The portal contains both measurement instruments and resources mapped to industry and certifications in multiple technology fields.



Fig.3-7. Research Portal Storyboard. Shannon, J. (2015)

The screenshot displays the CTE Portal interface. At the top, there is a navigation bar with links: Home, CTE Programs, Forum, Quizzes, CTE Preparatory Students, CTE Exploratory Students, Resilience/Adaptation Game, and Videos. A search bar and user account links (AdminCP, Profile, Account) are also present.

The main content area shows a user profile for 'KENTON' with account information and activity points. Below this, there is a section for 'CTE Peers Online (0)' and a 'Share' section with options for CCR Status, Photo, Link, and Poll. A text input field contains the question 'Are you exploratory or preparatory?'. A 'SORT' dropdown menu is visible.

The activity feed lists recent events and quizzes:

- SkillsUSA Regional Competition**: created an event. Like • Comment • Share • Report • [User], 2015 3:51 pm
- State Competition**: created an event. Like • Comment • Share • Report • [User], 2015 4:00 pm
- Resilience/Adaptation**: created a quiz. This is a method of using CTE Portal to collect data on the thoughts on resilience and adaptation for all stakeholders united. You will be able to view the progress of this activity as it progressi... Like • Comment • Share • [User], 2015 12:49 pm

A yellow banner at the bottom of the feed states: 'There are no new feeds to view at this time.'

On the right side, there are sections for 'CTE Events' (What's the event? FRIDAY, MARCH 18 SkillsUSA Regional Competition No birthdays coming up.) and 'CTE Shoutbox'.

The footer contains copyright information (CTE Portal © • English (US) •) and links (About, Privacy, Invite, Terms, Contact Us, Mobile, Enable DnD Mode). A chat button labeled 'Chat (0)' is located in the bottom right corner.

Fig.3-8. CTE Research Portal. Shannon, J. (2016)

For the purposes of this developmental study, the portal serves as a means to connect research instruments with CTE learners. Options currently provided in the product include capabilities to administer proven scales focused on motivation, questionnaires with open-ended response opportunities, and quizzes that give perspective on current levels of career readiness.

The validity of research of research that can be performed by the product becomes increased exponentially by the existence of a portal dedicated to CTE research. First-year and second-year CTE learners finally have an actual network designed to assist them in their unique career development goals.

Designing for Research Capabilities

Once the actual registration process is completed, CTE students are taken into either an exploratory or preparatory pre-built environment. At this point, the custom graphical user interface (GUI) for either exploratory or preparatory learners comes to life. This serves as an interactive environment to gain industry awareness. In addition, participants can take advantage of navigation customized to meet career readiness needs combined with peer-to-peer collaboration opportunities.

Step one of this phase of design is to make decisions based on the intended audience. These users were made up of the CTE students and school administrators groups. The initial step here is to determine locations that meet the prerequisites that would align with research of this nature. An important characteristic is that the organizations all provide CTE training to high school students and offer multiple programs of study. In addition, the location provides a career track that directs them

through, at a minimum, two years of training. This is necessary to gauge motivation and gains toward career readiness amongst beginning (first-year) and more seasoned (second-year) CTE learners.

Once locations meeting the desired criteria are determined, attention then turns to getting CTE learners registered in the CTE Portal as a first-year or second year participant. The CTE Portal has this necessary component as a built-in feature of the online registration form. This alone will segment the data into the proper subset of the database, thus avoiding data collection and treatment being provided to learners from the wrong sample group in a given study. The CTE Portal system is design to send out invites, along with access codes, to specific student email addresses to ensure that the correct registration procedures are followed and to strengthen the integrity of the overall data being collected.

CTE learners, once logged into the CTE Portal, are provided a variety of industry specific information and interactive opportunities. Quizzes, videos, communication systems, certification prep material, technology games and other resources will be made available to CTE learners at appropriate career readiness development stages.

The quality of the data that is drawn out of the CTE Portal is critical. This is a concept that has been built into the portal's design. It is important to note, two questions have been added to the top of both measurement instruments available within the portal. One question is related to gender and the second is additional reassurance that the participant is indeed a first-year or second-year CTE learner.

This is an important step to ensure data quality. In addition, participants input their randomly generated access code into each of the instruments in order to provide opportunities to show relationships between the data. These steps also aide in providing opportunities for this research to be expanded.

The qualitative approach must not be overlooked for this type of research. The CTE Portal has been designed to perform qualitative research in a more seamless, organized and applicable manner. Registered CTE users have the ability to proceed in the execution of mostly open-ended questionnaires in order to bring in CTE experiences from a deeper, more personal level. The analyzing of year-one and year-two samples can provide data on what degree the portal has on motivation towards industry certification and general career readiness. Once again, the design allows for organization combined with the user's perception of anonymity to be honest in responses. Registered users will input randomly generated access codes in each of the instruments in order to provide opportunities to show relationships between the data. Such data can be compiled in the database and used from a CTE student's high school years on into their college and career by keeping the accounts active. This is a prime example of how the CTE Portal has the potential to better illustrate the relevancy CTE programs have in preparing future technicians for life and career in a new and innovative way.

Treatment Capabilities

With the now existing CTE Portal, it becomes possible to observe CTE learners and actually provide treatment according to previous data and observed

conditions. This offers many avenues for future research. The interaction and environment present in the portal aides in the guiding of treatment. Such treatment comes in a variety of forms. Virtual treatment exists in the form of interactive tools, and human form in relation to a network of peers, educators, administrators and industry leaders.

Within the treatment phase of research, intervention, or the addition of outside stakeholders often increase the risk of influencing participant responses. The CTE Portal has been designed to greatly decrease the likelihood of this common threat to validity. Treatment becomes an actual part of the normal options and activities that are enabled or disabled on the backend of the portal at the most timely point determined in a given research activity. This makes participants more accepting of the change, thus allowing the results to be based more heavily on the treatment alteration rather than the presence of the researcher(s).

Methodology Summary

The CTE portal offers potential for growth in the area of industry certification and career readiness. In addition, within the confines of CTE training, motivation and viable methods now become more applicably measurable for educators and researchers. Performing research with the portal opens doors to new areas of research and development in the area of career readiness. This is a promising step in the continued pursuit to narrow the gaps that exist in learners becoming genuinely career ready.

Limitations of the Portal

The CTE Portal is limited, to a degree, in that it is pursuing the development of a new industry-centered portal that has not been previously done in this geographical area. This, in combination with the specific nature of technology training, makes the data somewhat less generalizable to some audiences. Although, the gap between academic and career is narrowing, making even less of an issue.

In addition, a common occurrence with the CTE programs located in this geographic area is that first-year learners are greater in number than second-year. Due to sample availability, the use of the portal may not be fully representative of CTE learners who actually attain preparatory status much earlier in high school. An example of this being a freshman afforded the opportunity to enroll in a CTE program that is participating in a block schedule. However, a sufficient number of second-year students are continuously available to show relationships under normal conditions experienced at state-operated area technology centers in District 11. To combat this occurrence, the design of the portal allows researchers to partition users according to additional characteristics such as grade level, gender and so forth.

One major limitation consists of some programs of study may not be equally representative of female participants. The overall sample at technology centers will be more balanced due to other programs having much higher female enrollment. However, it is important to note for future research purposes that some programs may not possess this gender balance at the time a given study occurs. This could have an

impact when comparing individual program data with other geographic locations that may be more equal at the time.

Providing timely treatment in these programs of study prepares learners on a greater level. The CTE portal's design takes this important concept into careful consideration. The joining of a social learning portal and interactive industry certification resources is an opportunity that positions learners and industry for efficiency and inventiveness.

Findings/Identified Strategies and Products

The combination of .PHP and MySQL lives up to the notoriety the combination has received over the past few years. Having the added assurance of being able to go deep within the tables of the database to make custom changes is a highly valued lifeline for an administrator of an online product of this level. The database backup and retrieval proved to be highly effective for work of this nature. However, as with any technology, it is important to have safeguards in place.

Risk	Security Assessment	Action Taken	Outcomes
False profiles	Over time, the CAPTCHA process is not a sufficient preventative alone.	Multiple step registration Email validation enforcement Multipage design for the registration process Customized and more randomized CAPTCHA codes Use of “invitation only” system of allowing members to register	No additional false profiles successfully registered during research period
Anonymous posts	Random posts can occur over time that have not been manually entered. Evidence leads to the previous risk of false profiles.	No specific measures taken in order to determine connection to the false profiles vulnerability above.	Research shows a direct link between anonymous post issues and false profile vulnerabilities
SQL injection vulnerabilities	Even though evidence is not present, the potential risk remains.	Minimize privileges assigned to each database Use strongly prepared statements with queries	Strengthening of database integrity

Table 4-1. CTE Portal Security Threat Assessment. Shannon, J. (2016)

An online research portal, by nature, is designed for the purpose of meeting objectives over time. It is that needed variable of time that makes the integrity of the database a primary directive to portal administrators. As seen in Figure 4-1 above,

data runs the risk of being compromised without attention to industry-accepted security procedures.

False profiles are rampant across the World Wide Web and impact the online resources it provides to the world. Upon the initial build, it became quickly apparent that this was a major issue that needed to be addressed early in the development process. With spam software increasing in availability and complexity, it was clear that a single maneuver would not suffice. The multiple step registration process consisting of a variety of form objects eliminates many of the more basic threats in existence. Although, this is only a small portion of overall threats today. Email validation add a level of complexity to the process in that an alternative email server must be contacted and authenticated. Then, the email from the CTE Portal must be accessed and the generated link executed in order to allow activation.

The physical design itself can also aide in security. This is an interesting facet as society does not often visualize a direct link between the physical arrangement of an online resource and the end result of strengthened database integrity. The multiple page registration design calls for decisions to be made at different intervals of the registration process, thus once again increasing the difficulty required for unwanted automated inputs necessary to result in success. Although, from this research it was determined that these steps alone still leaves a few doors open for nefarious attempts.

The CAPTCHA process has been a trusted method of increasing the likelihood that it is an actual human attempting to register within an online resource. However, as detection abilities have improved dramatically over the past few years,

this system can no longer be relied upon as a standalone solution. For this reason, it is important for those duplicating research activities such as this nature to consider implementing a process of customized CAPTCHA codes. These can be created with standard image editors and add considerable security to the process by no longer relying on a preexisting database of CAPTCHA codes likely to be broken by past, current or future malicious software packages. Furthermore, it is important to note that there has been a great deal of positive research that is now coming out on the reCAPTCHA system of authentication. As more data becomes available on comparisons between two methods, it is likely that the CTE Portal will make the transition to this system, or perhaps a customized hybrid of the two.

With all of these methods in place there still exists a more complex threat. Due to this research it was determined that combining the methods above greatly decreased intrusion. However, a major goal of this researcher was to provide a learning environment that was as conducive as possible, or that could be delivered by means available during research and development phases. Success, at least at the time of recording these findings, was deemed as attained with the implementation of and “invitation-only” combined with the previously mentioned measures.

Database integrity and the steps involved in achieving it is an ongoing process. However, it is a worthwhile venture if a portal is to be used to track data over time. As time passes, issues such as these quickly become exponentially problematic, thus running the risk of database corruption. An undertaking of this nature in the pursuit of collecting data over time elevates the importance of these

strategies even more. As with any research endeavor, it is pivotal to avoid threats to validity. Finding patterns in data that would have been partially generated from malicious, nonhuman means, is not acceptable. With a more stable recipe for a research database in place, attention can also be increased in the opportunities provided by the CTE Portal.

The built-in CTE messenger provides a useful strategy for follow-up questions and occasional clarifications that may arise from research. An interesting finding, in relation to the messenger, is that it also seems to provide an effective medium to connect administrators as well as instructors from other programs of study to CTE students. This is certainly an added benefit and method of increasing a learner's support network in industry.

The industry forum provides a constructive outlet for industry-focused discussion and problem-solving amongst peers. As CTE students become resources for specialized areas on the forums, it has the potential to greatly increase motivation in that future technologist to continuously grow and remain a valued source of peer expertise.

It has been determined that the CTE Portal can aide in improved organization strategies in other areas of a program of study as well. It has the capabilities of meeting a need of instructors by giving them a simple way of adding resources to their classroom profile. Popular items among CTE instructors have been the ability to insert links to industry websites, posting of certification training material and announcements.

It is no secret that learners at the secondary level respond well to gaming. The system takes advantage of this by allowing technology-focused games to be easily embedded into a page. An effective strategy to build upon here involves taking the situations that occur in the technology game and put it into action in the lab, or vice versa in some cases.

Due to the targeted age range and educational focus of the CTE Portal, safeguards must also be in place concerning appropriateness of content. It is important to have features such as user content reporting and filters. The content report feature virtually enlists users to click a link and report questionable content back to portal administration. In addition, text filters aide tremendously in content control without giving users the impression that they are being policed or watched. When it is correctly configured, known lists of content that is unacceptable can be added to the database on the backend of the portal. When unacceptable text is entered into the portal, it automatically posts a predefined substitution for the word or phrase. This sends the message that such activities are not allowed in the site, but in a way that removes the human factor that can negatively influence the portal's actual usage rates.

It is logical to assume that the majority of instructors and student users will not be versed in the use of coding languages. For this reason it important to note that when creating a product such as this, a WYSIWYG editor is a positive addition. When CTE users have access to these additional, easy-to-use options it is determined to amplify the level of interaction that occurs. A critical design aspect of this is to

find a balance between user needs versus that of security and performance. This leads to disabling specific features in many of the prebuilt, open source editors available today. Such features can open the door for the user to execute scripts on the site that are otherwise refused. Other strategies to consider for work of this nature would include having registered users complete a certain level of activity before the account becomes permanently live to the public. This is an additional means of filter out false profiles, as well as increases the user's personal investment in the portal. Both of these attributes come into play when considering the integrity of data being pulled from the portal of a considerable amount of time.

An additional finding worthy of note relates to optimization of file sizes when providing a product of this nature to a large number of users. From research and testing it is apparent that the user must also take responsibility, to a degree, in relation to keeping the site functioning at peak performance. Due to the varying experience that a user may possess concerning file sizes and types, it was determined that these improvements be made a requirement rather than an option. For example, there can be a major difference in the file size of a .PNG versus that of a .JPEG, even if the two images appear to preview at about the same size dimension wise. The same is true of audio and video files that may be uploaded as a resource or showcase of a student's work in the lab. It is for these reasons that it was determined to set restrictions on file size and type to ensure fast loading times. However, it is logical to consider that many users would not have the software, or experience in some cases, to decrease these settings within an image to be uploaded. To more seamlessly combat this

design challenge, there is now a script that automatically makes a duplicate of the image and sizes it appropriately according to predefined constraints once uploaded. For researchers considering the undertaking of work of this nature, it is a must that the design reflects such intuitive strategies to better ensure performance and longevity of the product.

There was another important finding along the same lines as described in the passage above. As with any online product security is a must. Products of this nature are often a target of unwanted advertisement and fake profiles. The first finding in this area involves the necessity of turning off registration to the public. The invite-only strategy was determined to be the best method of maintaining the integrity of registration and the portal as a whole. The design decision of sending a key by email in order to be permitted to register was pivotal to success of the portal. This method combined with reCAPTCHA and email verification on registration, among other steps, provide a portal conducive to career training.

Reflections, Actions, and Implications

Reflections

Career and technical education is a large entity when viewed as a whole. Initial research with this product is actually narrowing this focus down to state-operated CTE schools that only serve high school students within the Big Sandy Region of Kentucky. This research sets out to determine an area of investigation that would positively impact all of these CTE schools regardless of the programs of study

seeking improvement. Upon several years of personal interviews with numerous state instructors and administrators it was determined that motivation for industry certification was a widely shared area that needed to be further researched and that a CTE Portal was a logical choice for performing such research. It is essential to develop the internal process of motivation in order to increase the potential for CTE learners to demonstrate the determination necessary to reach a level of preparedness necessary to attain industry certification and career readiness.

From a more technical perspective, the strategies discovered to combat page weight through optimization features drastically reduced loading times for modules and login. Times were assessed between the point of hitting enter or clicking login, with the correct credentials, and the point in which the user had access to perform activities on the dashboard of the portal. Limiting the file types to the most common and performance friendly, greatly reduced reports of media not loading or loading with errors.

From testing and development .PHP 5+ and MySQL 4.1+ would be the minimum benchmarks to acquire in the implementation of a portal with the number of users, modules and resources available. Linux CentOS 6+ would be recommended as a minimum in terms of hosting platform options. This researcher has not tested comparable alternatives such as Windows Server 2008 or 2012+. This could be considered as a limitation of this research and should be taken into consideration in future duplications of this work with those who have preferences for platforms such as Windows Server.

Actions

Necessary actions for continuation to the next phase of research involves sending registration invitations out to administrators across Kentucky in order to gain insight into additional unknowns that may limit the growth and overall use of the portal. This step will also reveal pertinent information about the programs of study. As previously stated, this initial research is focused on ATC District 11. Area technology centers are placed in a community in order to mesh with the types of industry present in a given region. As we move across the state, the norm for industries surrounding these career centers change. This has the potential to alter the program of studies available in the portal to be used by a given career center.

An area that has proven fruitful is linked to the use of technology-driven gaming to make connections with research. More research needs to take place in this area as to locating more of these resources and aligning them to the corresponding program of study and lab activities the games could be mapped to. Gaming in education has certainly been a popular area for research over the recent years. Such research lends itself well to the portal approach to training and is a promising area for continued analysis.

A productive addition to the portal was the implementation of an activity points system. This strategy is used to increase learner activity within the portal. Points are awarded according to subject-focused comments and peer assistance provided in the industry forums. In addition, CTE users can earn activity points for attending specified career events posted in the portal and posting projects that being

done within the program of study a student is actively enrolled. Quizzes, videos and participation in research activities all earn CTE students activity points. To further this momentum, CTE instructors are presented with the opportunity to have rewards for their students upon reaching predefined activity point milestones.

An important action to follow when duplicating work of this nature is to carefully consider the rights of both the user, the educational institution, industry and the researcher(s). With this mindset in place, it become logical to include a Terms and Agreements section to the portal in order to offer information on many of the expectations that exist in usage. In addition, a Privacy Statement would be particularly of interest as a portal of this nature collects data on registered users for research purposes. These resources should be available and accessible from numerous locations throughout the portal.

Implications

The researcher embarked on the creation of this product with the belief that the CTE Portal can positively provoke measureable and applicably noticeable change. Providing CTE learners with the specialized resources that are clearly relevant to their unique career goals was a strategy that weighed heavily on design decisions. A major implication that results is the fact that research, more specifically treatment, can take place in these dynamic CTE environments with a much lower level of disruption and threat.

A bright future for industry preparedness is at hand with the advent of the CTE Portal. The transition in data collection can more seamlessly occur in the

journey from secondary school to a career. There are even implications of stronger alignment between CTE and postsecondary technology training as a result of the versatility and fluid design of the centralized portal.

It is the hope of this researcher that this work inspires other educators to take on the role of creating a product that is specialized to the unique environment and needs present in this and other areas of academia. Without question, high levels of motivation exist in young people to learn by digital means. There certainly are no shortages of portals available to users. Again, it is the belief of this researcher that the specialized design and attention to industry-related environment that more openly allows learners to make the necessary connections with the information being offered in the portal. For CTE, these connections must translate into transfer of learning that equips these young technologists for a lifetime of more seamless technical upgrade. This is certainly a rich area for future research with the advent of this portal, as well as a potential catalyst for career and technical education relevancy.

In CTE a major priority is to prepare young adults for success in a career. This makes the CTE portal a natural choice for the 21st Century learner. It is also important to note, the environment present in area technology centers makes data generalizable in many industries and areas of technical training. This is promising for both this research and future opportunities to expand. Furthermore, future technicians have become primed for learning through the use of such technical innovations.

Without attention to motivation through this lens, CTE runs the risk of missing out on a rich area for research, continuous improvement and genuine career readiness.

21st Century Educational Leadership

Effective leadership is influenced, positively or negatively, by the conditions in place that are surrounding the proposed change. Educational leadership becomes strengthened when stakeholders of an institution can unite as a team. There must be clear and measureable goals targeted for the organization to focus efforts. In addition, for educators to be highly motivated to continuously improve there must be accepted methods of providing them a voice at all levels.

The CTE Portal specifically addresses each of these important components to 21st Century educational leadership. Technology is a widely accepted method of maintaining an organized institution. The customization options afforded to educators in the portal provides them with a sense of buy-in. They can actively invest in the providing of additional resources and activities that promote growth from within the CTE Portal. This product provides an innovative opportunity for instructors and administrators to collaborate by means of a communication system with industry leaders out in the community.

The design of the CTE Portal naturally allows career readiness goals to become more clearly defined. Furthermore, the dynamic resources provided make these goals more measureable and attainable. Having a product tailored to career

readiness needs increases opportunities for research. This new avenue for data collection allows leaders to make timely decisions on which areas of a CTE program of study is in need of further development. The ability to have this information in a more real-time manner allows educational leaders to provide resources while there is still time available in the current school year to benefit student career goals.

From a researcher's standpoint, this work has proven instrumental in terms of leadership development. Schools often look to prebuilt software products to meet their goals. These products are often designed for the mainstream market, thus limiting inventiveness and leadership options for users. Alternatively, after pursuing a more customized approach in this work, it is evident that the process itself causes designers to take on leadership roles within an organization.

The Servant-Leadership Model (Greenleaf, 1970) most closely reflects the mindset and approach needed at the core of developmental research under the given conditions. The added guidance of such an approach logically contributes to the released version of the product being more widely accepted. This is often a major barrier in creating technology change on this level. Users can develop an impression that the software is not reflective of their unique job duties. Servant-leadership naturally provides feedback for leaders that can be used to tailor the product to meet specific needs.

For example, giving CTE instructors a voice in what elements of career readiness need to be present in the product increases the likelihood of it fostering improvement. It is logical to assume instructors are experts in their field and would serve as an effective means of providing specialized industry resources. Taking leadership components such as this into consideration during design allows the work to venture into a more predictive state. It allows the product to align with the current vision of the organization, thus allowing researchers to better differentiate between add-on and fundamental features. On a deeper level, the servant-leadership approach leaves users with the impression of having a vested interest in the new product.

On some level, the product itself can be a proponent of servant-leadership. Design choices have the power to influence the decisions of stakeholders. Providing a virtual environment that empowers both instructors and learners to make decisions on training allows leaders to emerge from the process. Providing educators with such liberties opens the door for resources to be broadcasted out to learners that may have otherwise gone unnoticed. It is important to note, there must be a balance between maintaining the physical integrity of the product while still offering options for the users to facilitate continuous growth and relevancy.

In addition, there are close ties between servant-leadership and the development of the CTE Portal in terms of community. A product that relies heavily on peer interaction greatly benefits from a design that takes a user's sense of community into account. Furthermore, having built-in features that connect industry

representatives out in the community with learners in a given CTE program of study narrows the gap between training and being genuinely ready for career. On a larger scale, this causes the community to experience a greater sense of ownership in a given organization, thus resulting in increased resources for the training provider.

There are many opportunities to lead in Career and Technical Education. These leadership moments should be viewed as opportunities to serve others. Maintaining focus on the development of a culture that encourages others to lead benefits the CTE system and our workforce as a whole. This research serves as an example of how leadership principles often associated with organizational direction can also play a major role in design.

The CTE Portal bridges a gap between educational leadership and career. This product provides leaders with an effective means of gathering highly relevant data on the CTE learner's journey beyond the classroom walls and into entry-level positions. Such data is essential to preparing the workforce for continuous change. This strengthens relationships between training being provided and current industry needs, thus leading CTE to 21st Century career readiness.

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Appendix

CTE Portal

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Home


CTE Portal helps connect CTE educators and students with research opportunities and industry resources.

Sign Up
Get Technical . . . It Pays!

CTE Portal is a research-based, invite only community project through the Morehead State University Ed.D Program. Enter your email below if you have received an invitation.

Email:

[Submit](#)



**KENTUCKY
TECH**

CAREER AND TECHNICAL EDUCATION

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Jeff Shannon
Account Info • CTE Activity Points (214) • Edit Profile • CCR Peer Profile Views (0)

Customize Dashboard
Wednesday, March 23, 2016 7:04 pm

CTE Peers Online (0)
No peers online.

Recent Logins

Share: [CCR Status](#) [Project Photo Update](#) [CCR Links](#) [Stamp a Peer!](#)

Are you exploratory or preparatory? Industry certificate attained?

Jeff Shannon created a CTE event.
SkillsUSA Regional Competition
Like • Comment • Share • Report • January 13, 2016 7:50 pm

Jeff Shannon created a CTE quiz.
CTE Adaptation Instrument
This is a method of using CTE Portal to collect data on the thoughts on adaptation for all stakeholders united. You will be able to view the progress of this activity as it progressing in real time.
Like • Comment • Share • January 13, 2016 7:48 pm

There are no new CCR Activity Feeds to view at this time.

CTE Events
What's the event?
No birthdays coming up.

CTE Shoutbox-Project Talk

Jeff Shannon
January 13, 7:52 pm
IT students - Please use this section to share progress with our CTE network... Mr. Shannon

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Automotive Technology

Automotive technology is speeding into the future -- be a part of it. Our automotive program includes lecture and shop experience in all phases of automotive maintenance and repair.

Training includes use of computerized tech manuals, hand held meters and scanners, as well as power and hand tools. Instruction and practice is provided in diagnosis and repair of engines, ignition systems, fuel systems, brakes, manual and automatic transmissions, front-ends including alignment, air conditioning, heating systems, and emission controls. Instruction in systems such as engines, fuel, on-board computers, transmissions, steering, suspension and brakes is the basis of this program.

Knowledge of the various systems is used to develop skills in troubleshooting, performing preventive maintenance, servicing and repairing automobiles.

Industry Certification(s) Path



- [Automobile & Light Truck \(Includes Auto Service Consultant Test, Light Vehicle/CNG, Exhaust Systems\)](#)
- [Auto Maintenance & Light Repair \(G1\)](#)
- [Collision Repair & Refinishing \(Includes Damage Analysis & Estimating\)](#)
- [Truck Equipment](#)
- [Transit Bus](#)
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- [Advanced Level L1 – Composite Vehicle Type 3 Reference Booklet](#)
- [Advanced Level L2 – Test Information](#)
- [Advanced Level L2 – Med-Hvy Composite Vehicle Type 3 Reference Booklet](#)
- [Advanced Level L3 - Light Duty Hybrid/Electric Vehicle Test Information](#)
- [Parts Specialist \(P1 and P2\)](#)
- [GM Parts Consultant \(P4\)](#)
- [Medium-Heavy Truck](#)
- [School Bus](#)

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Business & Marketing

The Business & Marketing program provides training in preparing business documents, transcribing data, managing records, handling communications, scheduling, handling financial transactions, operating a variety of business equipment, ordering and supervising personnel. A wide range of computer equipment and software may be used in performing these tasks.

Office personnel serve as an information hub for a business by scheduling appointments; providing information to internal and external customers; organizing and maintaining paper and electronic files; managing projects; and producing correspondence. They use personal computers to run spreadsheet, word processing, database management, desktop publishing, and graphics programs.


Microsoft Office Specialist (MOS)

- (MOS) Certification
- IC3 Certification
- IC3 Certification Advantages
- Assessment of Skills and Knowledge for Business (ASK)
- (ASK) Exam Manual

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Carpentry Technology

Carpentry is designed to prepare students for employment in the residential and commercial construction industry. Students are involved in blue print reading, layout, fabrication, foundation, walls, floors, ceilings, and roofs of structures. Training will emphasize instruction in the care and safe use of hand and power tools.

The Carpentry program offers many opportunities for a young person. Carpentry students will learn how to do rough layouts of floors, walls, and roofs. They must be able to use good judgment to decide on proper procedures in order to perform the task at hand in the most efficient, safest manner.

Projects, both inside and outside the classroom, are used to reinforce lessons taught. The course content is selected to prepare students for further education and/or work in this and related fields.

NCCER Construction Certification Path



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- [Carpentry, Level 1](#) Course Planning Tools
- Performance Profiles
- Revision Map
- [Carpentry, Level 2](#) Performance Profiles
- Revision Map
- [Carpentry, Level 3](#) Performance Profiles
- Revision Map
- [Carpentry, Level 4](#) Course Planning Tools

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Electrical Technology

The Electrical Technology curriculum is designed to prepare or upgrade individuals to service, maintain, repair, or install equipment for a wide range of industries. Instruction includes theory and skill training needed for inspecting, testing, troubleshooting, and diagnosing industrial equipment and physical facilities.

Students will learn technical skills in blueprint reading, electricity, residential, commercial and various maintenance procedures. Practical application in these industrial systems will be emphasized and additional advanced course work may be offered.

Upon completion of any of the various levels of this curriculum, graduates should gain the necessary practical skills and related technical information to qualify for employment or advancement in the various areas of the electrical field.

NCCER Electrical Certification Path



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- [Electrical, Level 1 > Course Planning Tools](#)
- [> Performance Profiles](#)
- [Electrical, Level 2 > Course Planning Tools](#)
- [> Performance Profiles](#)
- [Electrical, Level 3 > Course Planning Tools](#)
- [> Performance Profiles](#)
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Page successfully updated.


Health Science

The Health Sciences program provides the secondary student with orientation, exploration, and preparation into the health care industry.

Courses are sequenced to provide continuous student progress toward achievement of a certificate. The integration of mathematics, science, communication, and technical knowledge is a vital component of each course offering.

The program is designed for students who desire entry level training and/or plan to enroll in a post secondary program in one of many occupational areas in the health field.

Certified Nursing Aide Competency Exam



- [KY State Certification Process, Procedures & Resources](#)

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HVAC Technology

The HVAC program provides students with the skills necessary to work on air conditioning, refrigeration and heating units. CTE students are provided the opportunity to learn and gain work experience in the fast-paced and in-demand field of technology.

Students learn to troubleshoot, install, service and repair the various types of equipment found in the HVAC industry. This may include, but is not limited to, service of refrigerators and freezers, reach-in freezers, ice-making equipment and home and commercial units.

NCCER HVAC Certification Path



**NATIONAL CENTER FOR
CONSTRUCTION EDUCATION
AND RESEARCH**

- HVAC, Level 4> Course Planning Tools
- > Performance Profiles
- HVAC, Level 4> Course Planning Tools,
- > Performance Profiles
- HVAC, Level 4> Course Planning Tools
- > Performance Profiles
- HVAC, Level 4> Course Planning Tools,
- > Performance Profiles
- HVAC, Levels 1-4> Revision Map

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Information Technology

The Information Technology program provides the concepts and skills needed to diagnose and repair personal computers and design, set up, maintain, and expand networked computer systems. Students are also trained to design, build, and maintain websites according to industry standards.

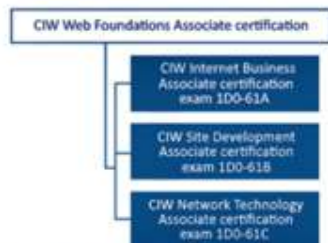
The program is designed to prepare students to take industry recognized certification examinations like the National CompTia A+ Hardware & Software Certification Exams for computer maintenance and the CIW exam for web design. The CompTIA Authorized Partner Program for Academy Partners offers a robust educational program designed to assist academic institutions, nonprofit organizations, and government retraining agencies in enhancing the learning experience for students preparing for an IT career.

We can help students acquire the necessary knowledge, skills, and credentials for a successful IT career path. This includes resources to help students choose potential paths of employment, and education on opportunities for long-term career growth. The program includes information, tools, and resources designed to help school administrators and instructors plan, prepare, and deliver an effective IT curriculum.

Employment opportunities include entry-level positions in computer repair and network administration as well as web designer. Students will need basic computer skills, plus grade level reading and math prior to entering this program.



- [Adobe Certification Exams >> Certification Areas](#)



Certified Internet Webmaster (CIW)

- > Internet Business Associate (1D0-61a)
- > Site Development Associate (1D0-61b)
- > Network Technology Associate (1D0-61c)

CompTia+ Certification

Why CompTIA A+?

- Required for Dell, Intel and Lenovo service techs
- Recognized by U.S. Dept. of Defense
- Nearly 1 million IT professionals strong!
- > 220-801 Objectives
- > 220-801 Objectives

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Welding Technology

Welders combine mechanical comprehension with a bit of science and a touch of artistry in making something as simple as a kitchen utensil or as complex as an offshore drilling platform or a component used in the outer space program.

The Welding Technology program prepares students for industry or other job related fields. Welding students are presented with the knowledge to weld various types of metal using several methods and processes. Students are trained in layout, blueprint reading, work orders, job site safety, and estimating materials for the job.

Students are taught safety, joint design, welding terminology, types of machines and accessories, basic joints and positions, types of cast iron, carbon and air arc cutting, ventilation and protective devices, filler metal and electrodes.

American Welding Society Certification (AWI)

**American Welding Society**

- QC7-93, Standard for AWS Certified Welders
- QC7-93, Supplement C, Welder Performance Qualification Sheet Metal Test Requirements
- QC7-93, Supplement F, Chemical Plant and Petroleum Refinery Piping
- QC7-93, Supplement G, AWS Performance Qualification Test (generic supplement)

FOR - Details

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Discussions

General Questions

Threads: 0 · Posts: 0

Resilience & Adaptation

Hands on lab activity discussion

Threads: 0 · Posts: 0

Resilience & Adaptation Game

Threads: 1 · Posts: 0

Industry Certification Methods

Threads: 0 · Posts: 0

CTE Program (Project Showcase)

Automotive Technology

Threads: 0 · Posts: 0

Business & Marketing

Threads: 0 · Posts: 0

Carpentry Technology

Threads: 0 · Posts: 0

Electrical Technology

Threads: 0 · Posts: 0

Health Science

Threads: 0 · Posts: 0

HVAC Technology

Threads: 0 · Posts: 0

Information Technology

Threads: 0 · Posts: 0

Welding Technology

Threads: 0 · Posts: 0

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Quizzes Add New Quiz

CTE Adaptation Instrument

January 13, 2016 by Jeff Sherron

Actions

This is a method of using CTE Portal to collect data on the thoughts on adaptation for all stakeholders united. You will be able to view the progress of this activity as it progressing in real time.

- Before beginning this study had you given any thought the area of adaptation in technology?
 - Yes
 - No
- In relation to technology practices, do you believe adaptation can be improved?
 - Yes
 - No
- Do you think it is highly important that technologists be adaptive to situations?
 - Yes
 - No
- Have you ever had any formal adaptation training?
 - Yes
 - No
- Was the technology game an effective way to measure adaptation?
 - Yes
 - No
- As you progress further in the CTE program you are enrolled do you feel you are becoming more adaptive to technology issues?
 - Yes
 - No
- How highly do you perceive employers ranking the importance of being able to adapt in situations they may put you in? (1 low - 4 high)
 - 3
 - 2
 - 1 (low)
 - 4 (high)

Submit Your Answers

Tweet G+ 0

Like Comment Share


Report this quiz

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CTE PREPARATORY Assessment Tools:



- Step 1 > Wagnild & Young (1993) Resilience Scale Instrument™
- Step 2 > CTE Preparatory Survey
- Step 3 > CTE Preparatory Followup Questionnaire

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CTE EXPLORATORY Assessment Tools:



- Step 1 > [Wagnild & Young \(1993\) Resilience Scale Instrument™](#)
- Step 2 > [CTE Exploratory Survey](#)
- Step 3 > [CTE Exploratory Followup Questionnaire](#)

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This game is equipped to measure resilience and adaptation skills possessed by CTE learners.

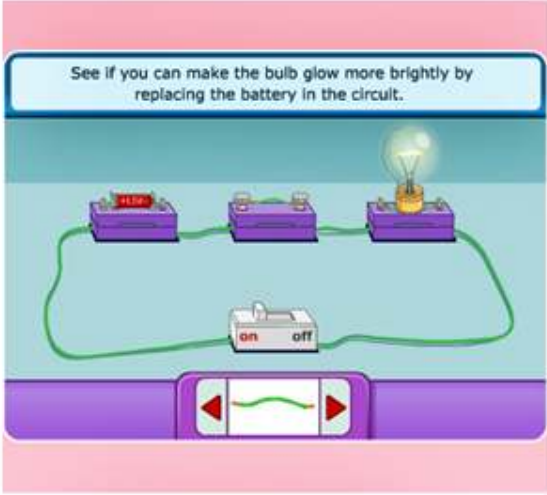
- 1) So that all facilities being measured have an equal playing field, do not enable audio/music or simply turn speakers off.
- 2) Continue on in the game until completion or until you no longer have a desire to continue.
- 3) Only have this screen or tab open. Do not look for outside sources to gain an advantage in the game.
- 4) IMPORTANT: The purpose here is how you approach, adjust and proceed during the game.



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This technology game goes along with the lab activity documentation you are to be provided. This activity is designed to help you to envision the outcomes associated with circuitry in the automotive, electricity, HVAC, information technology and welding programs.



Be sure to **RECORD** your results!

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Why Technicians Should Become ASE Certified
Check out this quick video describing just a few of the benefits of becoming ASE Certified. From...

00:00 / 00:15

- 1. Why Technicians Should Become ASE Certified**
Check out this quick video describing just a few of the benefits of becoming ASE Ca... 0
- 2. New ASE G1 Certification, Good or Bad? - ETEG1**
I read about the ASE G1 certification a little while ago on LinkedIn. There were so... 0
- 3. The New ASE Auto Maintenance and Light Repair Certification Test**
Recorded webinar from 5-28-13, on the new ASE Maintenance and Light Repair Cert... 0
- 4. ASE Testline Goes Digital**

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Microsoft Office Specialist Exam Demo
This quick 00:02:22 video details how to use Microsoft Office Specialist (MOS) certification...

01. Microsoft Office Specialist (MOS) 2010 Certification
Certiport, the official test delivery solution provider for the global workforce and ...

02. Microsoft Office Specialist Exam Demo
This quick 00:02:22 video details how to use Microsoft Office Specialist (MOS) cert...

03. Excel 2013 Tutorial MOS Certification Practice 1.4a
Excel 2013 Tutorial MOS Certification Practice 1.4a. Visit www.hunkim.com for mo...


04. Word 2010 Funnest MOS Study Questions

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ALGEBRA IN CONSTRUCTION



WE KNOW THE HEIGHT OF A STANDARD CMU
 $H_{CMU} = \text{HEIGHT OF 1 CMU} = 8"$

WE KNOW THE HEIGHT OF THE WALL TO BUILD
 $H_{WALL} = \text{HEIGHT OF WALL} = 10'$

HOW MANY COURSES ARE REQUIRED TO BUILD THE WALL?
 $N_{CMU} = \text{NUMBER OF CMU} = ?$

EQUATION:

$$N_{CMU} = H_{WALL} / H_{CMU}$$

Relevant Math In Construction
 Learn about relevant math in construction. Build your career in construction with NCCER. **CONSTRUCTION & ARCHITECTURE** **STEM ACTION!**

00:21 / 00:25

03. Women in Construction: Build Your Future
 In celebration of Women in Construction Month this March, NCCER and Build Your... 0

04. OSHA Violation in Atlanta, GA? Need NCCER Training? NCCER Classe
 false 0

05. Relevant Math In Construction
 Learn about relevant math in construction. Build your career in construction with... 0

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00:15 / 00:15

01. CNA Job Description What does a CNA do
CNA Job Description more information: <http://cna.practicetests.net/cna-job-descri...>

02. Certified Nurse Aide has to Think on Her Feet
Odessa Sulikowski is a Certified Nurse Aide (CNA) at the Grandvue Medical Care F...

03. Certified Nursing Assistant Career
Meet West Virginia caregivers and learn why they decided to become a Certified ...


04. Certified Nursing Assistant Skills Video - CNA Exam: FPD places

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00:17 / 00:28

01. Contactors HVAC Training
For more information regarding our HVAC Training please visit <http://www.hvactra...>

02. Basic Electricity - HVAC Training
For more information regarding our HVAC Training please visit <http://www.hvactra...>

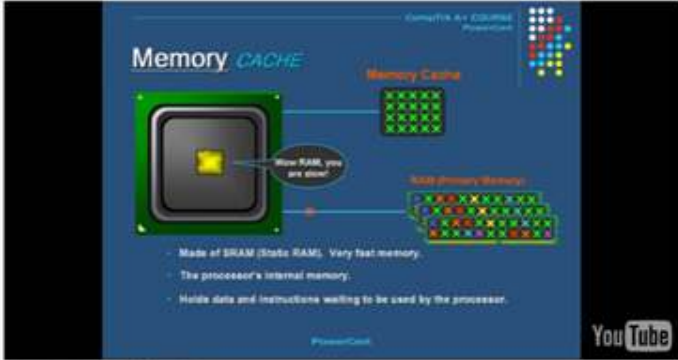
03. HVAC Training - Measuring Subcooling
For more information regarding our HVAC Training please visit <http://www.hvactra...>

04. HVAC Training - Dual Fan Coil Checkout

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Memory CACHE

Now RAM, you are slow!

- Made of SRAM (Static RAM). Very fast memory.
- The processor's internal memory.
- Hold data and instructions waiting to be used by the processor.

PowerCert

YouTube

73:10 / 73:11

01. What is the A+ Certification: Guide to the A+ Certification Exam
In this A+ Certification video we take a look at the IT Certifications, A+ Certificat...

02. What's New on the CompTIA 220-901 and 220-902 A+ Certification
A+ Training Course Index: <http://professormesser.link/220900> Professor Messer's...

03. CompTIA A+ Certification Video Course
This is the Animated CompTIA A+ Certification Video Course 220-901 from Power...

04. CompTIA A+ Certification (License to Tech): Studywin for the Exam

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03:15 / 04:51

01. Tig Welding Stainless Steel - Walking the Cup vs TIG Finger
<http://www.weldmongerstore.com/tig-finger/> A popular tig welding technique for ...

02. How To Pass The AWS CWI Exam
This video gives you some hints and tips on how to pass the American Welding So...

03. AWS 2013 Midwest Welding Competition
This is a yearly competition for high school welding students from Indiana and su...

04. Tech Time: AWS D1.1 Overhead Welding Test, Part 1 - Set on Ramon

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Test Prep and Study Methods

(a) ASVAB Practice

(b) ASVAB Practice

(c) ASVAB Practice

(d) ASVAB Practice

ASVAB Study Methods



Test Prep and Study Methods

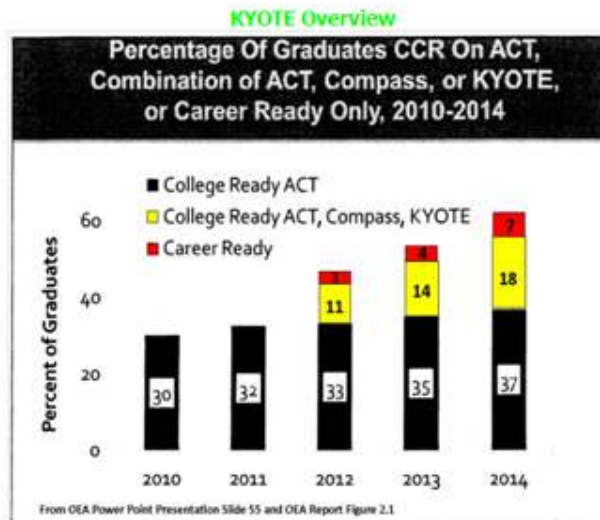
(a) KOSSA Practice

(b) KOSSA Practice (Business)

(c) KOSSA Practice (Marketing)

(d) KOSSA Skill Standards

Additional Prep Materials



Test Prep and Study Methods

(a) KYOTE Practice

(b) KYOTE Exam Standards

(c) KYOTE College Algebra Placement

KYOTE Study Methods



Test Prep and Study Methods

(a) Compass Mathematics Videos

(b) Compass Writing Videos

(c) Compass Reading Videos

(d) Compass Practice Test

(d) Compass ATC Sample Questions

Compass Study Methods

VITA

JEFF M. SHANNON

EDUCATION

May, 2001	Bachelor of Science Morehead State University Morehead, Kentucky
May, 2007	Master of Science Morehead State University Morehead, Kentucky
Pending	Doctor of Education Morehead State University Morehead, Kentucky

PROFESSIONAL EXPERIENCES

2002-Current	Information Technology Instructor Office of Career & Technical Education Prestonsburg, Kentucky
2005-Current	Continuing Education Coordinator Floyd County Area Technology Center Martin, Kentucky
2006-Current	Pearson VUE Administrator Prestonsburg High School Prestonsburg, Kentucky

HONORS

2006	KY Tech Teacher of the Year Finalist
2012	Program Assessment (First Perfect Score in District History)
2014	SkillsUSA Regional Program Champions
2015	Program Assessment (Perfect Score, Two Consecutive Cycles)
2015	SkillsUSA Regional Program Champions
2015	Congressional App - State Program Champions